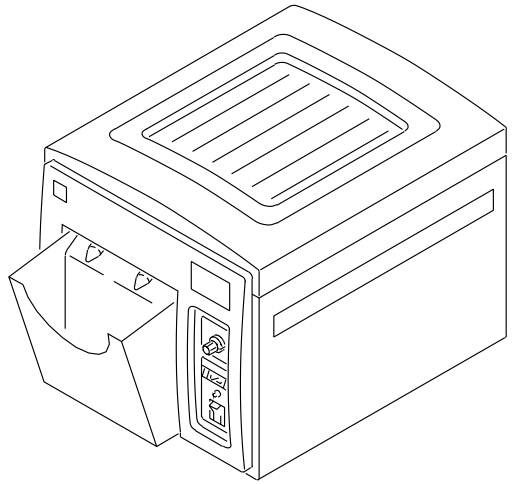
Publication No. 3E0819
29OCT99

HEALTH IMAGING

DIAGNOSTICS
for the
Kodak Min-R MAMMOGRAPHY PROCESSOR
Service Code: 3752

Important
Use qualified personnel to service this equipment.



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Warning

To avoid hazardous conditions, keep floors and floor coverings around your Processor and associated drains clean and dry at all times. Any accumulation of fluids from mixing tanks, drain lines, etc., should be cleaned up immediately. In the event of an accumulation of liquid due to backup, overflow, or other malfunctions of the drain associated with your Processor, call a plumber or other contractor to correct any problem with the drain. Kodak accepts no responsibility or liability whatsoever for the serviceability of any drain connected to or associated with a Processor. Such drains are the sole responsibility of the customer.

Radio Interference

Caution

This equipment generates, uses, and can radiate radio-frequency energy. If the equipment is not installed and used according to the instructions, it might cause interference to radio communications. The equipment has been tested and found to comply with the limits for a *Class A* computing device pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at the user's own expense will be required to take whatever measures may be required to correct the interference.

This digital apparatus does not exceed the *Class A* limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

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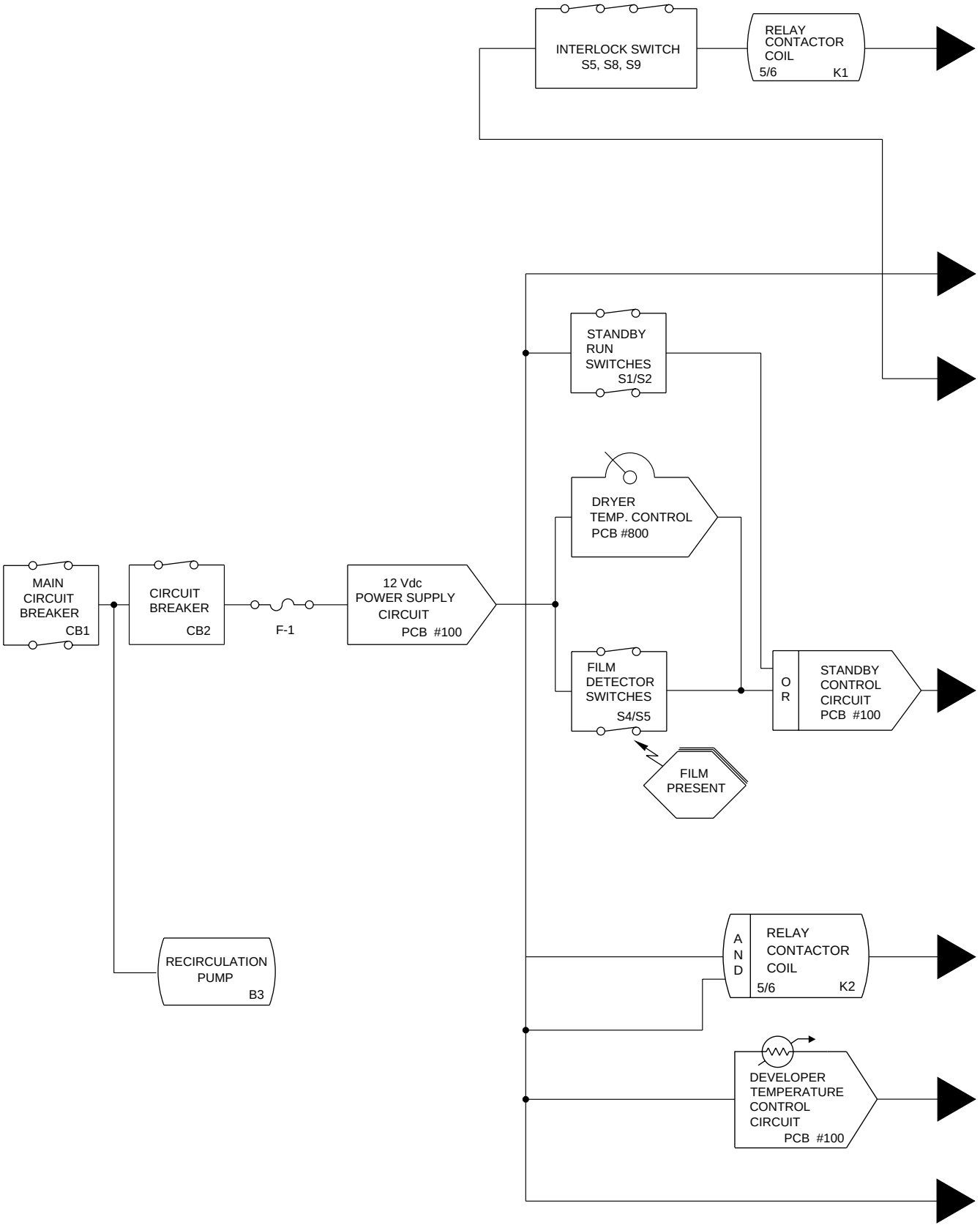
Section 1: Correcting Difficulties

1. Transport Failure						
	2. Surface Artifacts					
		3. Abnormal Film Densities				
			4. Wet Films			
				5. Low Solution Levels		
					6. Overlapping of Films	
1	**2**	**3**	**4**	**5**	**6**	
•					•	Film Feeding Error Feed only single thicknesses of film. Feed the next film only after the film feed signal sounds If there is no film feed signal, refer the difficulty to qualified service personnel.
•	•	•	•			Feed only compatible films.
•					•	Check that all Racks and Crossovers are seated correctly.
•	•					Check that the surfaces of all the Rollers are clean and smooth, especially in the Developer Turnaround Assembly.
•			•			Check that the Dryer Air Tubes are in the correct positions.
	•		•			Remove any dirt from the Dryer Rollers and Air Tubes from the Dryer Assembly, especially the slots. Use a bottle brush and rinse with water.
	•	•	•	•		Check that the replenishment rates are correct.
	•					Adjust the Dryer temperature control setting to the **lowest** possible temperature that still allows good drying.
	•					Clean the Feed Shelf and Detector Rollers.
•	•				•	Clean any biological growth in the Wash Tank with a mild solution of chlorine bleach. Use 60 mL (2 fl oz) of bleach per 3.8 L (1 gallon) of water. Wipe the Tanks with a soft sponge.
•				•		Check that the Weirs are seated correctly. Check that the Tanks are full.
•	•	•	•		•	Change any chemicals that were not mixed correctly, are exhausted, or are contaminated. Check that the replenishment flow rates are correctly set. Fill the Replenishment Tanks if necessary.
•	•				•	Check that <u>all</u> Rollers are in place and positioned and rotating correctly.
•	•				•	Check that <u>all</u> Roller Gears, Sprockets, and Idlers are engaged.
•	•				•	Replace any Roller that has a broken or worn Gudgeons.
•	•				•	Replace any Bearings that do not allow the Turnaround Rollers to rotate correctly.
•	•					Check the tension on the Rack Chain. Check that the Rollers do not hesitate and that the Chain moves smoothly.
		•				With the Processor on, check for movement on the surface of the solutions. Movement indicates recirculation.
•	•					If the incoming wash water is dirty, clean the Rack and Tank thoroughly. Change the incoming Water Filter. Use the correct Water Filter.
			•			Check that the Dryer Air Exhaust is free from any obstruction.
•					•	Check that the Turnaround Assembly is adjusted correctly. The Turnaround Assemblies must be square with the Racks.
	•	•				Check the incoming water temperature. Temperature must be between 4.4×°C (40°F) and 29.4°C (85°F).

1. Transport Failure	2. Surface Artifacts	3. Abnormal Film Densities	4. Wet Films	5. Low Solution Levels	6. Overlapping of Films	
1	2	3	4	5	6	
		•				Check that the correct Bulb and Safelight Filter are in the Safelight and at the correct distance from the Feed Shelf and work surface.
•		•				Check that the Top Cover is tight on the Processor. Check that there are no leaks in the Light Lock Gasket.
•						10 x 10 cm films - feed films diagonally if they fail to transport reliably.
					•	For all transport speeds, the buzzer should sound once the trailing edge of the film has advanced 75 mm (3 in.) into the Processor.
•	•	•			•	Check that the Tank solution levels are at the overflow Weirs.
				•		Check for solution in the Replenishment Tanks. Fill if necessary. NOTE: Mix developer replenisher in quantities not to exceed a 2-week supply.
		•				With a reliable thermometer, check that the temperature of the developer is correct. If necessary, have qualified service personnel make adjustments. NOTE: Check the incoming water temperature. It must be a minimum of 4×°C (7°×F) lower than the desired developer temperature.

Section 2: Sequence of Operation

Main Circuit



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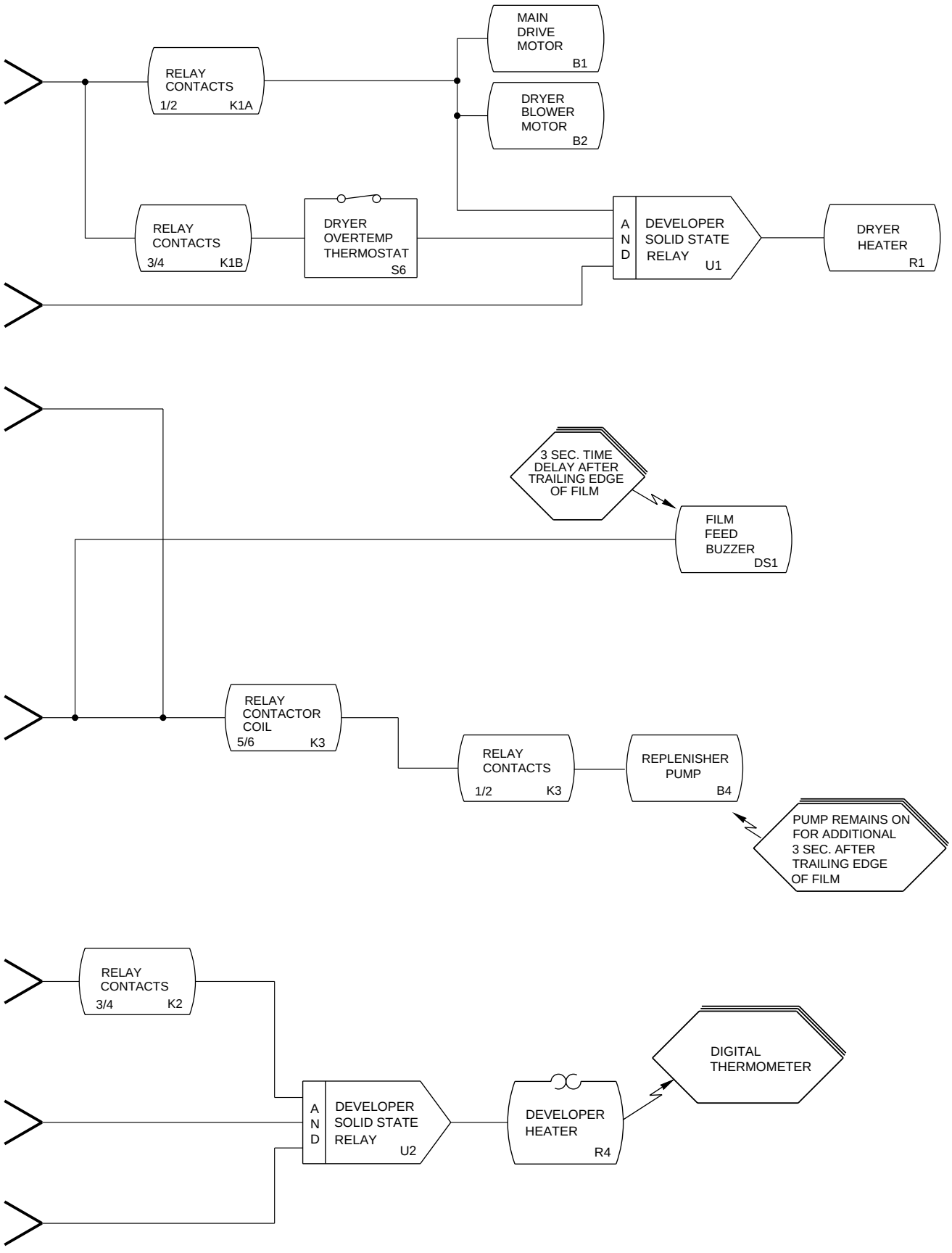
MAIN DRIVE MOTOR B1
RELAY CONTACTS 1/2 K1A
DRYER BLOWER MOTOR B2
RELAY CONTACTS 3/4 K1B
DRYER OVERTEMP THERMOSTAT S6
AND
DEVELOPER SOLID STATE RELAY U1
DRYER HEATER R1
3 SEC. TIME DELAY AFTER TRAILING EDGE OF FILM
FILM FEED BUZZER DS1
RELAY CONTACTOR COIL 5/6 K3
RELAY CONTACTS 1/2 K3
REPLENISHER PUMP B4
PUMP REMAINS ON FOR ADDITIONAL 3 SEC. AFTER TRAILING EDGE OF FILM
RELAY CONTACTS 3/4 K2
AND
DEVELOPER SOLID STATE RELAY U2
DEVELOPER HEATER R4
DIGITAL THERMOMETER

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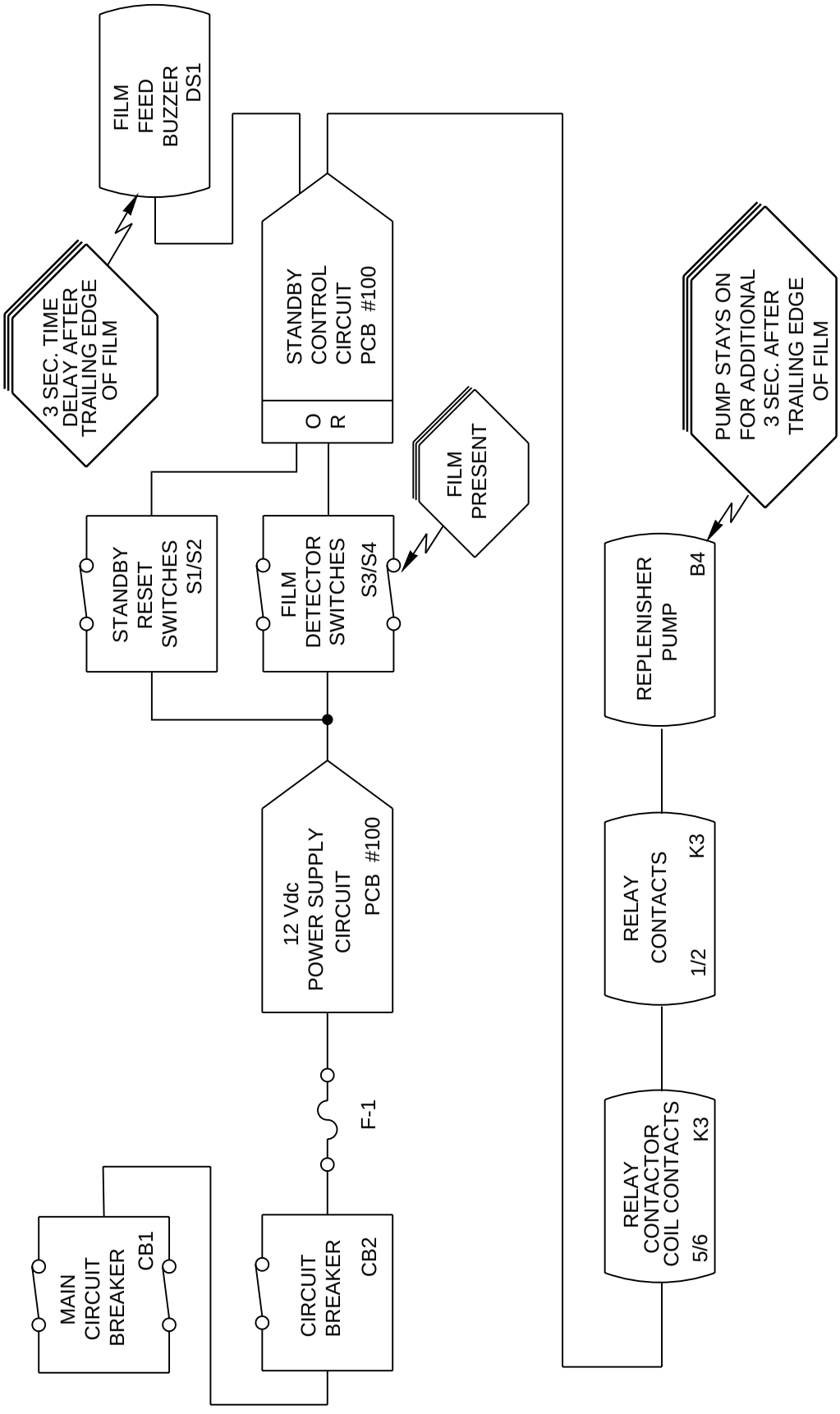
Film Detection and Replenishment


FILM FEED BUZZER DS1
3 SEC. TIME DELAY AFTER TRAILING EDGE OF FILM
STANDBY CONTROL CIRCUIT PCB #100
O R
FILM PRESENT
PUMP STAYS ON FOR ADDITIONAL 3 SEC. AFTER TRAILING EDGE OF FILM
STANDBY RESET SWITCHES S1/S2
FILM DETECTOR SWITCHES S3/S4
REPLENISHER PUMP B4
12 Vdc POWER SUPPLY CIRCUIT PCB #100
RELAY CONTACTS 1/2 K3
F-1
MAIN CIRCUIT BREAKER CB1
CIRCUIT BREAKER CB2
RELAY CONTACTOR COIL CONTACTS 5/6 K3

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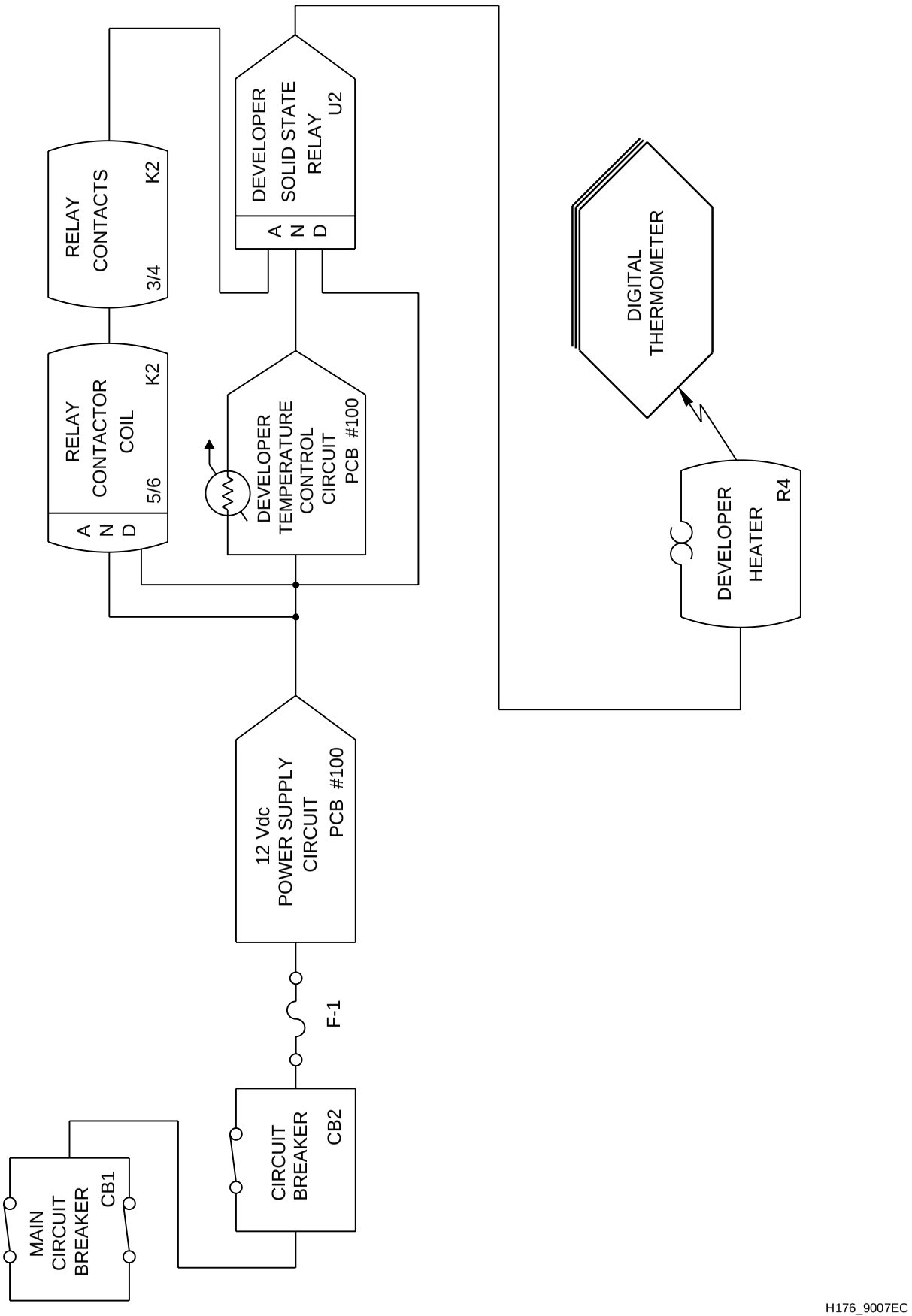
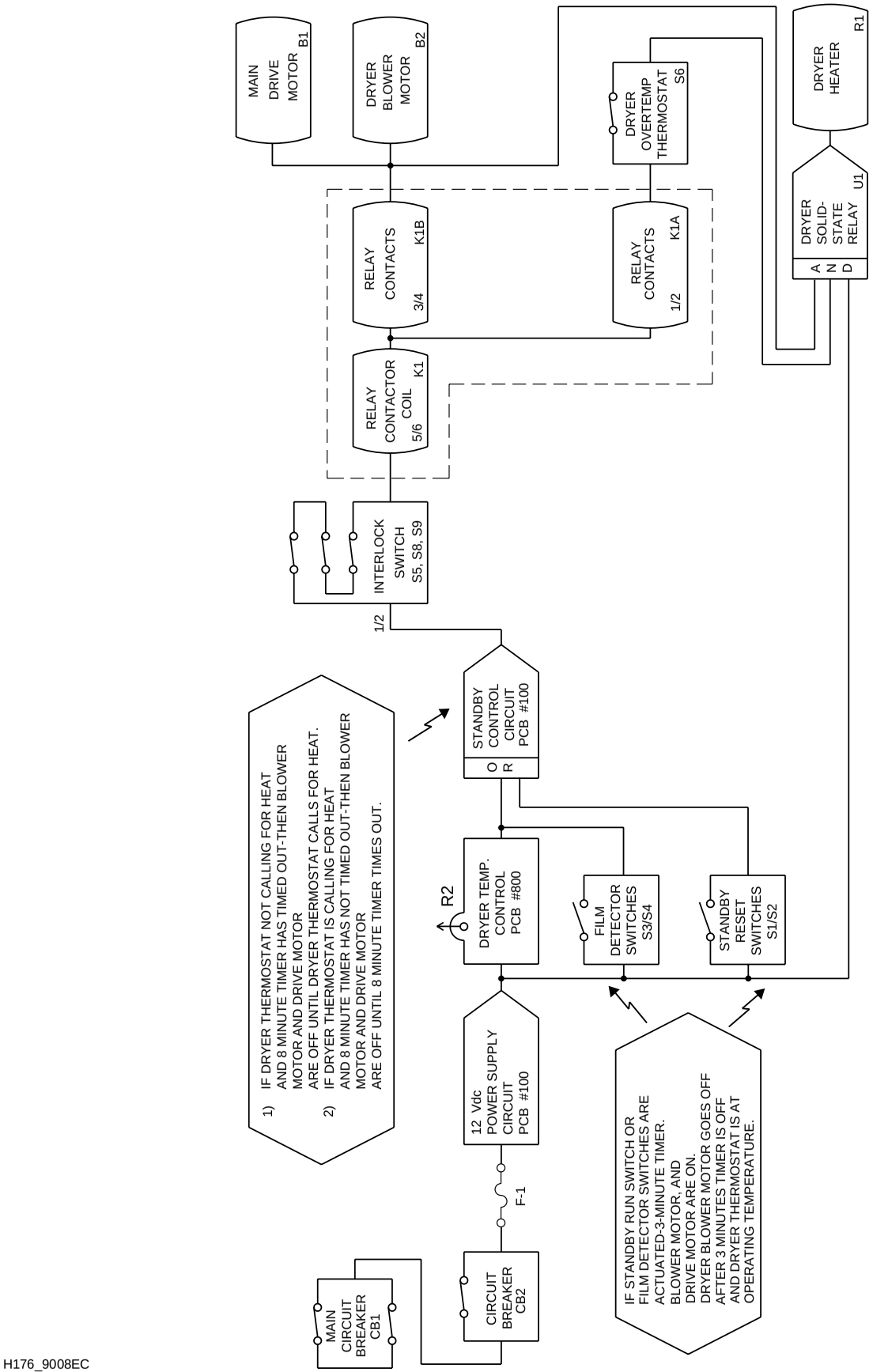
Developer Temperature Control



DRYER and DRIVE MOTOR


MAIN DRIVE MOTOR B1
DRYER BLOWER MOTOR B2
DRYER OVERTEMP THERMOSTAT S6
DRYER HEATER R1
DRYER SOLID-STATE RELAY U1
A N D
RELAY CONTACTS K1B 3/4
RELAY CONTACTS K1A 1/2
RELAY CONTACTOR COIL K1 5/6
INTERLOCK SWITCH S5, S8, S9
1/2
STANDBY CONTROL CIRCUIT PCB #100
O R
1) IF DRYER THERMOSTAT NOT CALLING FOR HEAT AND 8 MINUTE TIMER HAS TIMED OUT-THEN BLOWER MOTOR AND DRIVE MOTOR ARE OFF UNTIL DRYER THERMOSTAT CALLS FOR HEAT.
2) IF DRYER THERMOSTAT IS CALLING FOR HEAT AND 8 MINUTE TIMER HAS NOT TIMED OUT-THEN BLOWER MOTOR AND DRIVE MOTOR ARE OFF UNTIL 8 MINUTE TIMER TIMES OUT.
R2
DRYER TEMP. CONTROL PCB #800
FILM DETECTOR SWITCHES S3/S4
STANDBY RESET SWITCHES S1/S2
12 Vdc POWER SUPPLY CIRCUIT PCB #100
F-1
IF STANDBY RUN SWITCH OR FILM DETECTOR SWITCHES ARE ACTUATED-3-MINUTE TIMER. BLOWER MOTOR, AND DRIVE MOTOR ARE ON. DRYER BLOWER MOTOR GOES OFF AFTER 3 MINUTES TIMER IS OFF AND DRYER THERMOSTAT IS AT OPERATING TEMPERATURE.
CIRCUIT BREAKER CB2
MAIN CIRCUIT BREAKER CB1

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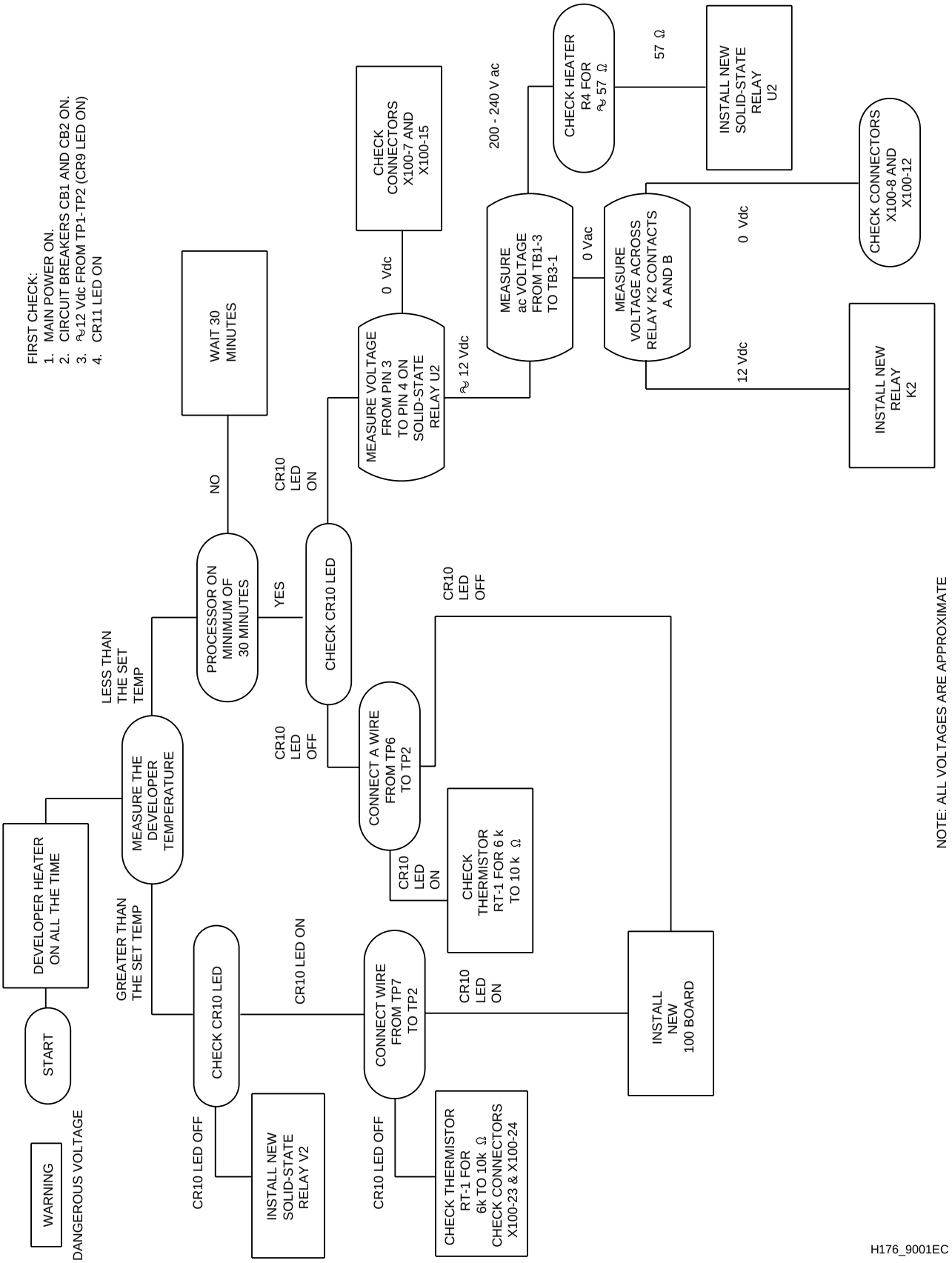
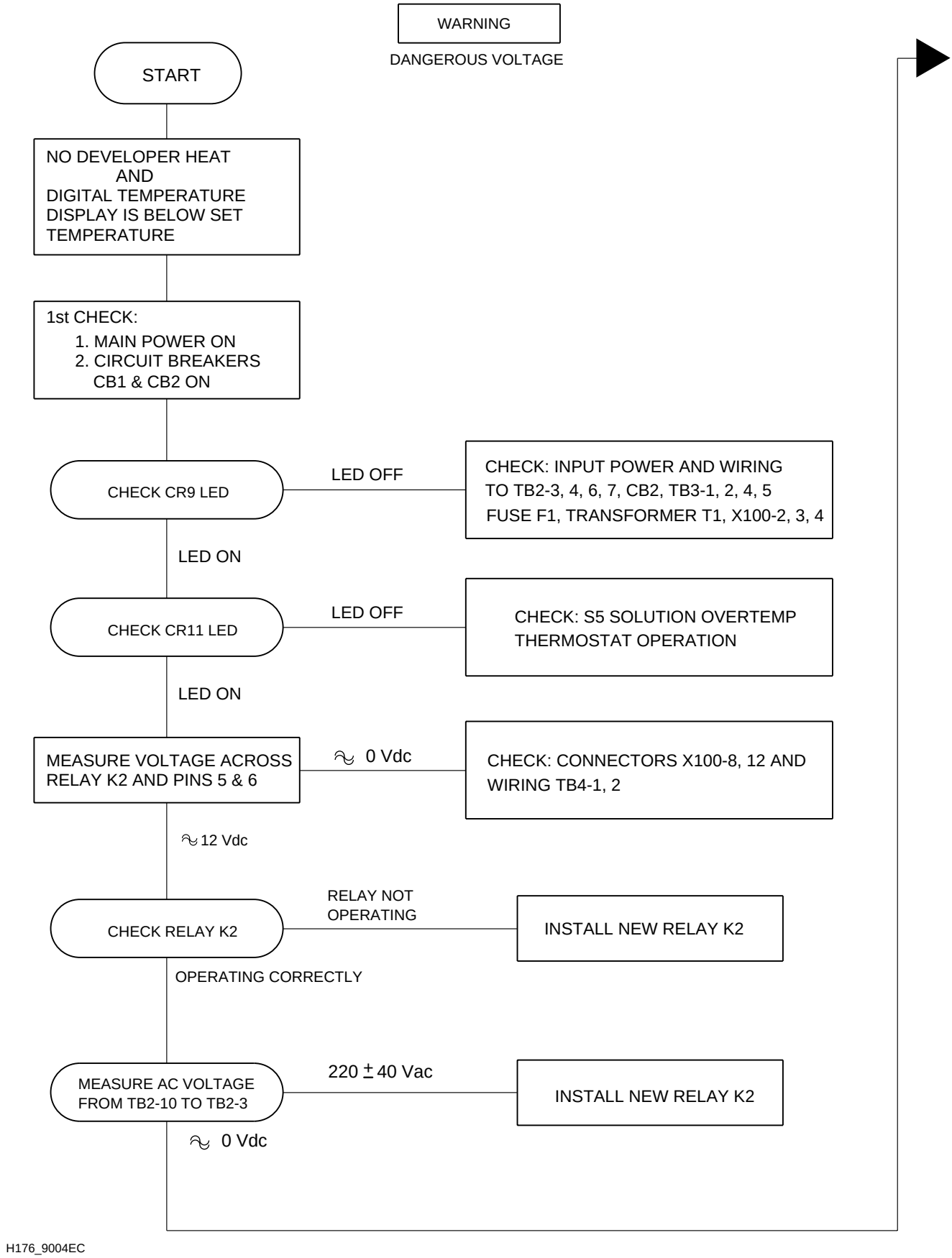
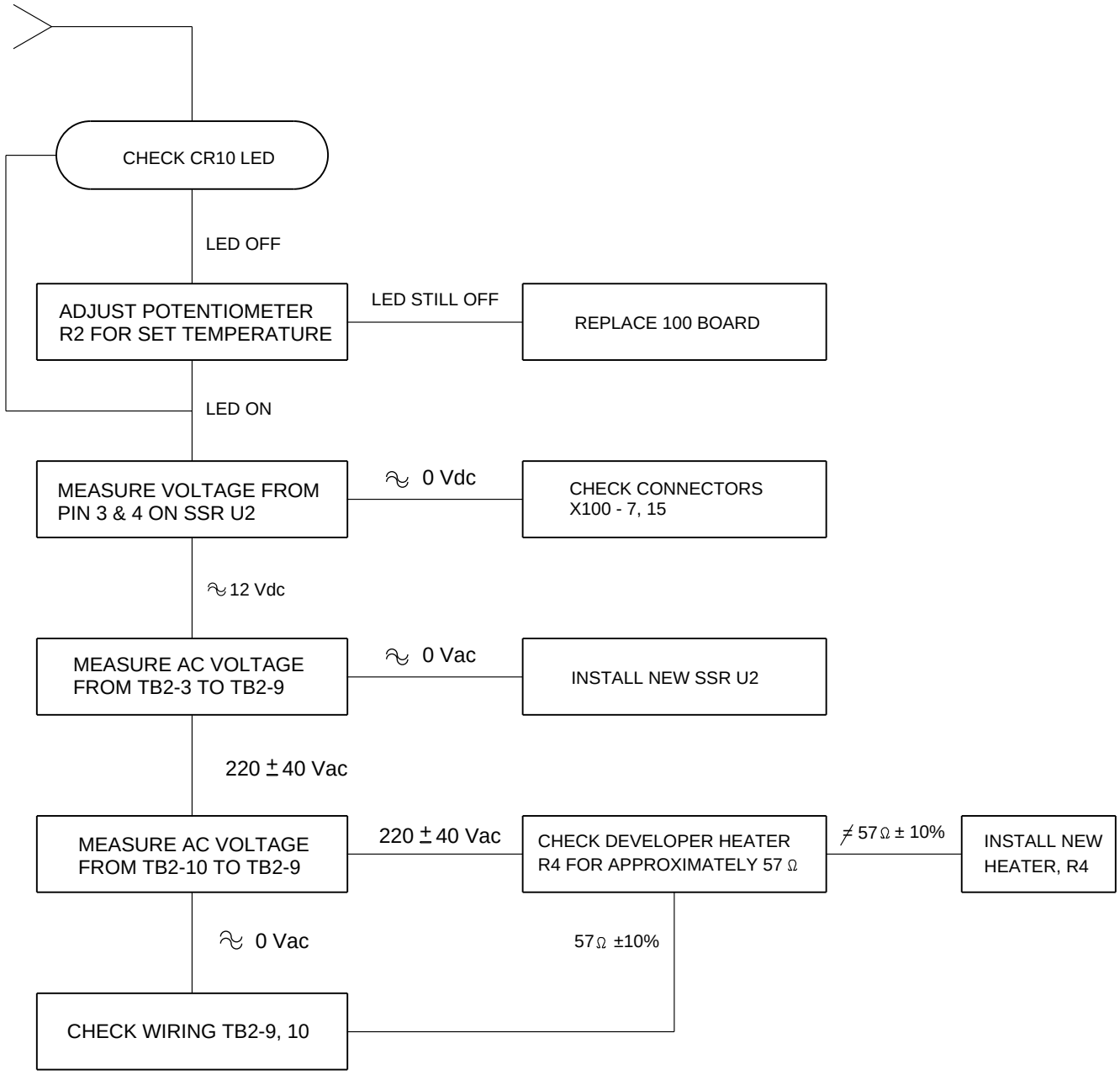
Section 3: Troubleshooting Flow Charts

DEVELOPER HEATER: On All of the Time


FIRST CHECK:
1. MAIN POWER ON.
2. CIRCUIT BREAKERS CB1 AND CB2 ON.
3. ≈12 Vdc FROM TP1-TP2 (CR9 LED ON)
4. CR11 LED ON
WARNING
DANGEROUS VOLTAGE
START
DEVELOPER HEATER ON ALL THE TIME
MEASURE THE DEVELOPER TEMPERATURE
LESS THAN THE SET TEMP
GREATER THAN THE SET TEMP
CHECK CR10 LED
CR10 LED OFF
INSTALL NEW SOLID-STATE RELAY V2
CR10 LED ON
CONNECT WIRE FROM TP7 TO TP2
CR10 LED OFF
CHECK THERMISTOR RT-1 FOR 6k TO 10k Ω CHECK CONNECTORS X100-23 & X100-24
CR10 LED ON
INSTALL NEW 100 BOARD
PROCESSOR ON MINIMUM OF 30 MINUTES
NO
WAIT 30 MINUTES
YES
CHECK CR10 LED
CR10 LED OFF
CONNECT A WIRE FROM TP6 TO TP2
CR10 LED ON
CHECK THERMISTOR RT-1 FOR 6 k TO 10 k Ω
CR10 LED ON
MEASURE VOLTAGE FROM PIN 3 TO PIN 4 ON SOLID-STATE RELAY U2
≈ 12 Vdc
0 Vdc
CHECK CONNECTORS X100-7 AND X100-15
MEASURE ac VOLTAGE FROM TB1-3 TO TB3-1
200 - 240 V ac
0 Vac
CHECK HEATER R4 FOR ≈ 57 Ω
57 Ω
INSTALL NEW SOLID-STATE RELAY U2
MEASURE VOLTAGE ACROSS RELAY K2 CONTACTS A AND B
0 Vdc
CHECK CONNECTORS X100-8 AND X100-12
12 Vdc
INSTALL NEW RELAY K2
NOTE: ALL VOLTAGES ARE APPROXIMATE
H176_9001EC

DEVELOPER: No Heat




CHECK CR10 LED
LED OFF
ADJUST POTENTIOMETER R2 FOR SET TEMPERATURE
LED STILL OFF
REPLACE 100 BOARD
LED ON
MEASURE VOLTAGE FROM PIN 3 & 4 ON SSR U2
≈ 0 Vdc
CHECK CONNECTORS X100 - 7, 15
≈ 12 Vdc
MEASURE AC VOLTAGE FROM TB2-3 TO TB2-9
≈ 0 Vac
INSTALL NEW SSR U2
220 ± 40 Vac
MEASURE AC VOLTAGE FROM TB2-10 TO TB2-9
220 ± 40 Vac
CHECK DEVELOPER HEATER R4 FOR APPROXIMATELY 57 Ω
≠ 57 Ω ± 10%
INSTALL NEW HEATER, R4
≈ 0 Vac
57 Ω ±10%
CHECK WIRING TB2-9, 10

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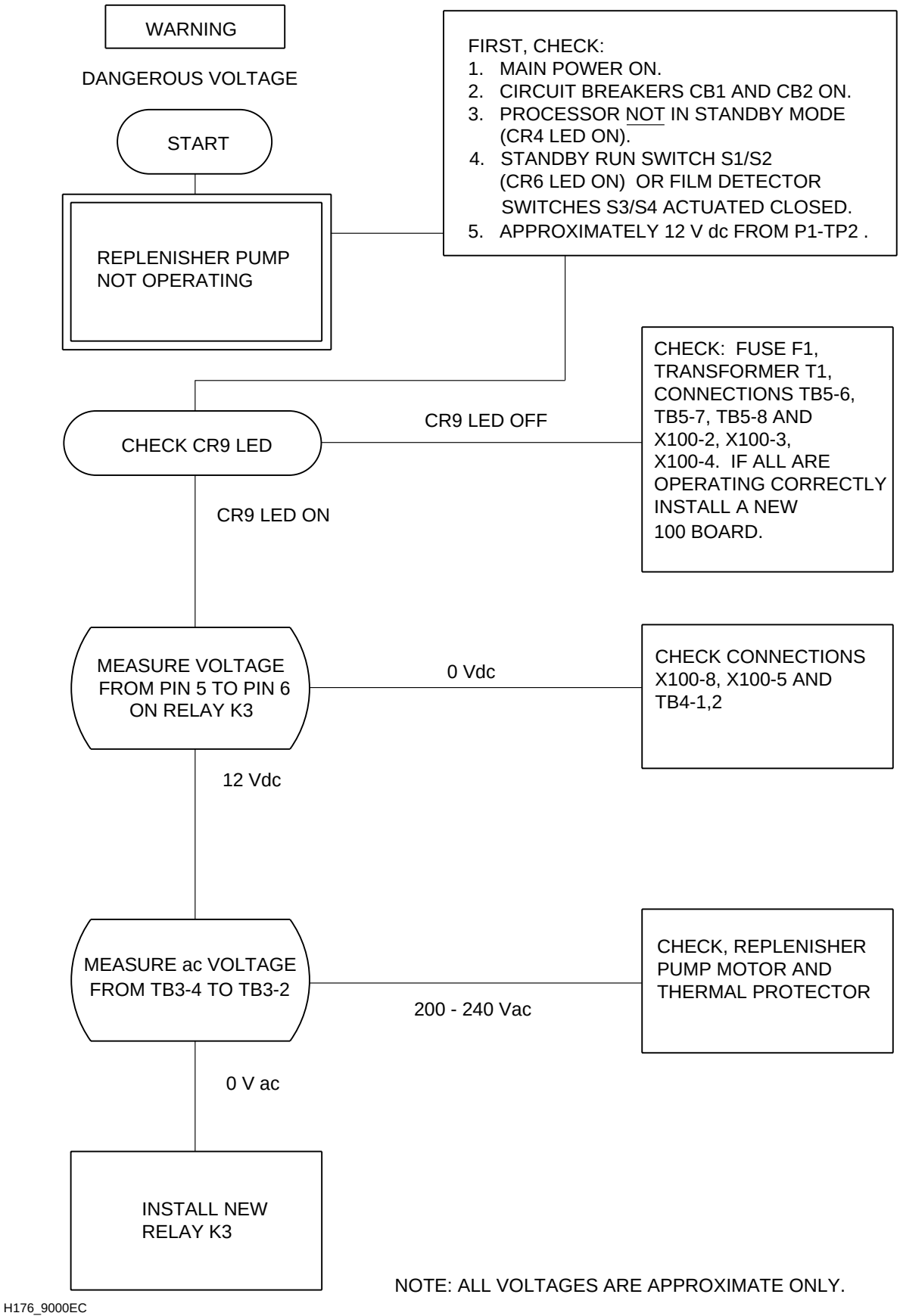
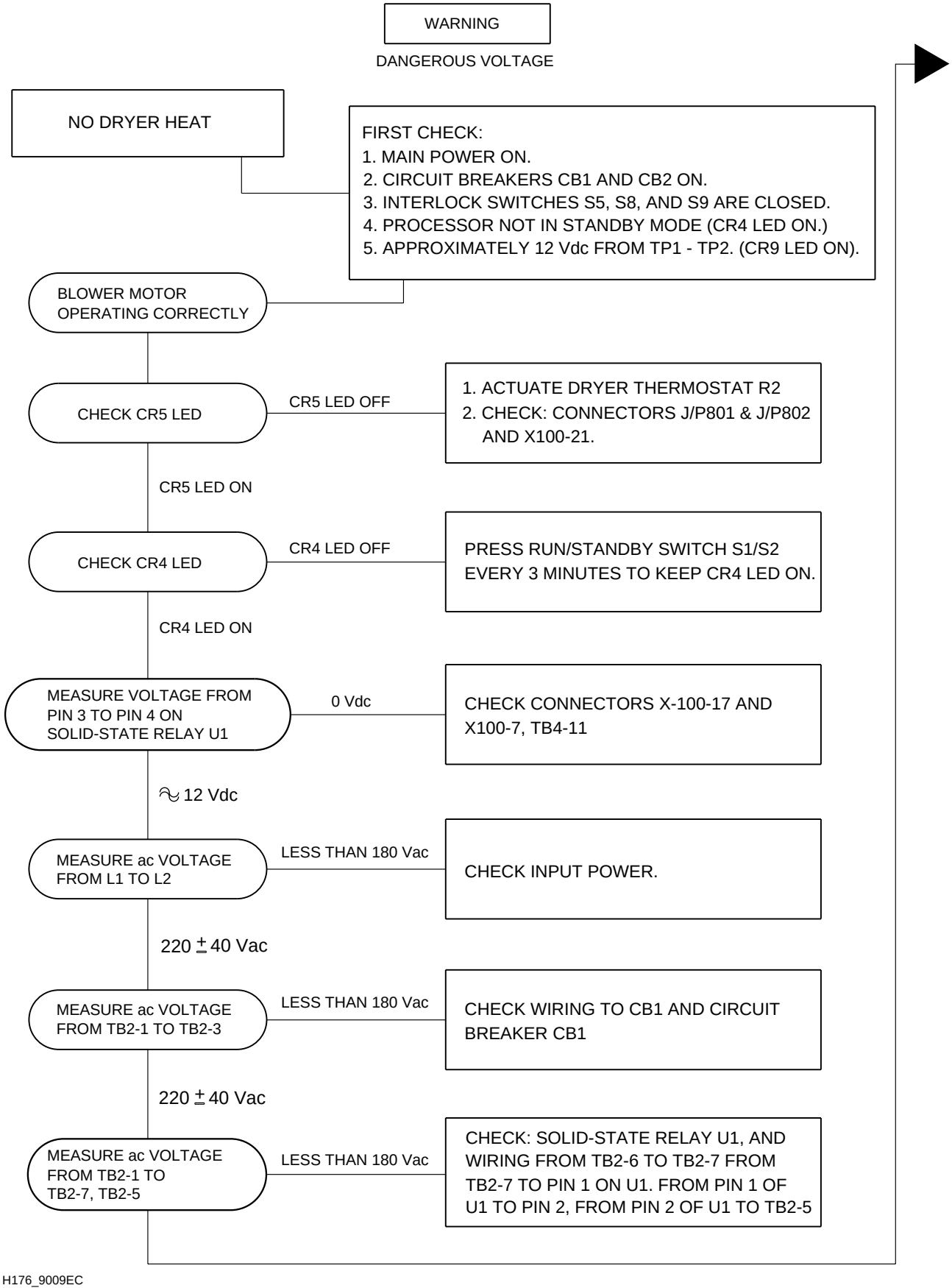
REPLENISHER PUMP: Not Operating


WARNING
DANGEROUS VOLTAGE
START
REPLENISHER PUMP NOT OPERATING
FIRST, CHECK:
1. MAIN POWER ON.
2. CIRCUIT BREAKERS CB1 AND CB2 ON.
3. PROCESSOR NOT IN STANDBY MODE (CR4 LED ON).
4. STANDBY RUN SWITCH S1/S2 (CR6 LED ON) OR FILM DETECTOR SWITCHES S3/S4 ACTUATED CLOSED.
5. APPROXIMATELY 12 V dc FROM P1-TP2 .
CHECK CR9 LED
CR9 LED OFF
CHECK: FUSE F1, TRANSFORMER T1, CONNECTIONS TB5-6, TB5-7, TB5-8 AND X100-2, X100-3, X100-4. IF ALL ARE OPERATING CORRECTLY INSTALL A NEW 100 BOARD.
CR9 LED ON
MEASURE VOLTAGE FROM PIN 5 TO PIN 6 ON RELAY K3
0 Vdc
CHECK CONNECTIONS X100-8, X100-5 AND TB4-1,2
12 Vdc
MEASURE ac VOLTAGE FROM TB3-4 TO TB3-2
200 - 240 Vac
CHECK, REPLENISHER PUMP MOTOR AND THERMAL PROTECTOR
0 V ac
INSTALL NEW RELAY K3
NOTE: ALL VOLTAGES ARE APPROXIMATE ONLY.
H176_9000EC

DRYER: No Heat


WARNING
DANGEROUS VOLTAGE
NO DRYER HEAT
FIRST CHECK:
1. MAIN POWER ON.
2. CIRCUIT BREAKERS CB1 AND CB2 ON.
3. INTERLOCK SWITCHES S5, S8, AND S9 ARE CLOSED.
4. PROCESSOR NOT IN STANDBY MODE (CR4 LED ON.)
5. APPROXIMATELY 12 Vdc FROM TP1 - TP2. (CR9 LED ON).
BLOWER MOTOR OPERATING CORRECTLY
CHECK CR5 LED
CR5 LED OFF
1. ACTUATE DRYER THERMOSTAT R2
2. CHECK: CONNECTORS J/P801 & J/P802 AND X100-21.
CR5 LED ON
CHECK CR4 LED
CR4 LED OFF
PRESS RUN/STANDBY SWITCH S1/S2 EVERY 3 MINUTES TO KEEP CR4 LED ON.
CR4 LED ON
MEASURE VOLTAGE FROM PIN 3 TO PIN 4 ON SOLID-STATE RELAY U1
0 Vdc
CHECK CONNECTORS X-100-17 AND X100-7, TB4-11
≂ 12 Vdc
MEASURE ac VOLTAGE FROM L1 TO L2
LESS THAN 180 Vac
CHECK INPUT POWER.
220 ± 40 Vac
MEASURE ac VOLTAGE FROM TB2-1 TO TB2-3
LESS THAN 180 Vac
CHECK WIRING TO CB1 AND CIRCUIT BREAKER CB1
220 ± 40 Vac
MEASURE ac VOLTAGE FROM TB2-1 TO TB2-7, TB2-5
LESS THAN 180 Vac
CHECK: SOLID-STATE RELAY U1, AND WIRING FROM TB2-6 TO TB2-7 FROM TB2-7 TO PIN 1 ON U1. FROM PIN 1 OF U1 TO PIN 2, FROM PIN 2 OF U1 TO TB2-5

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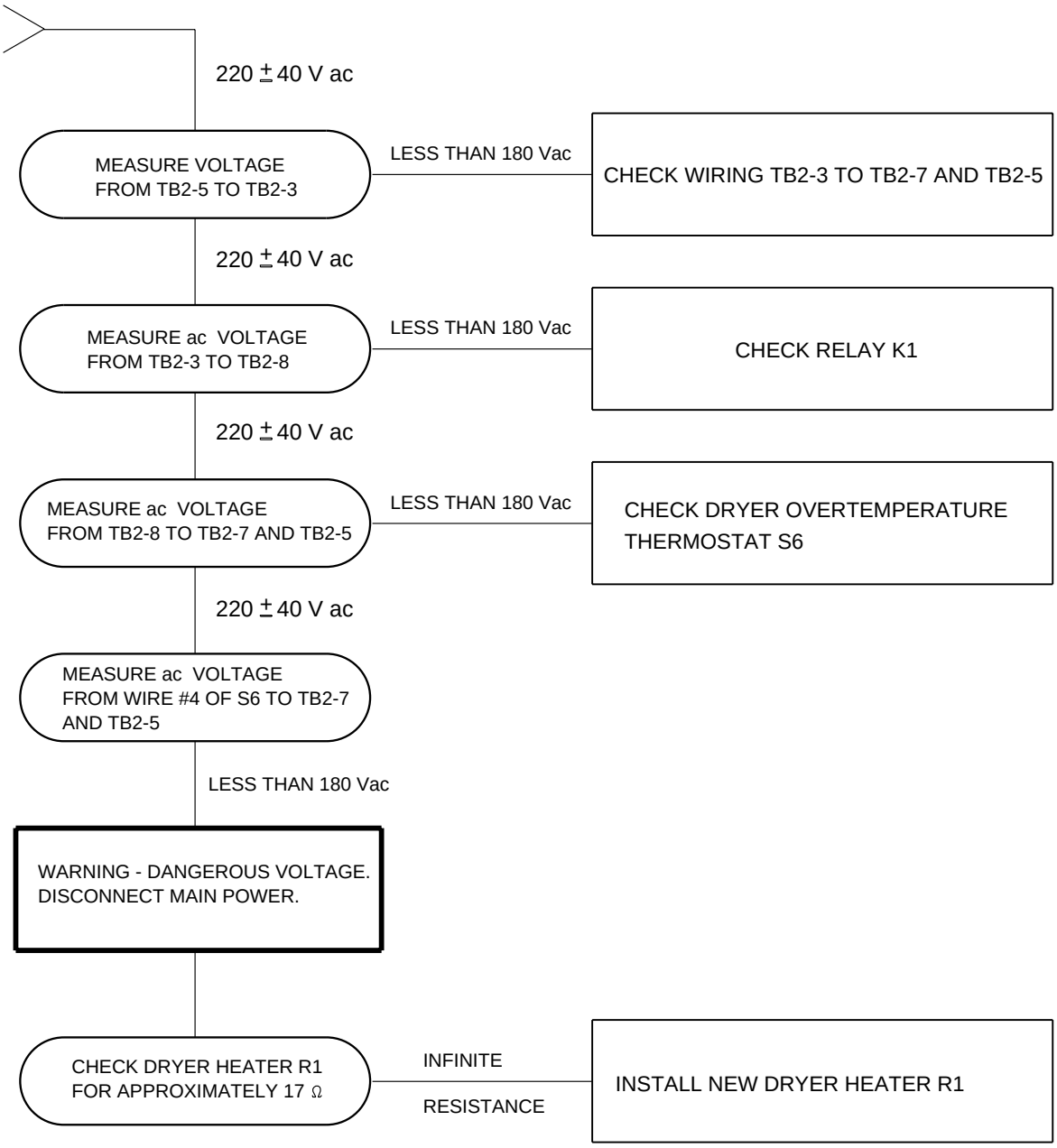
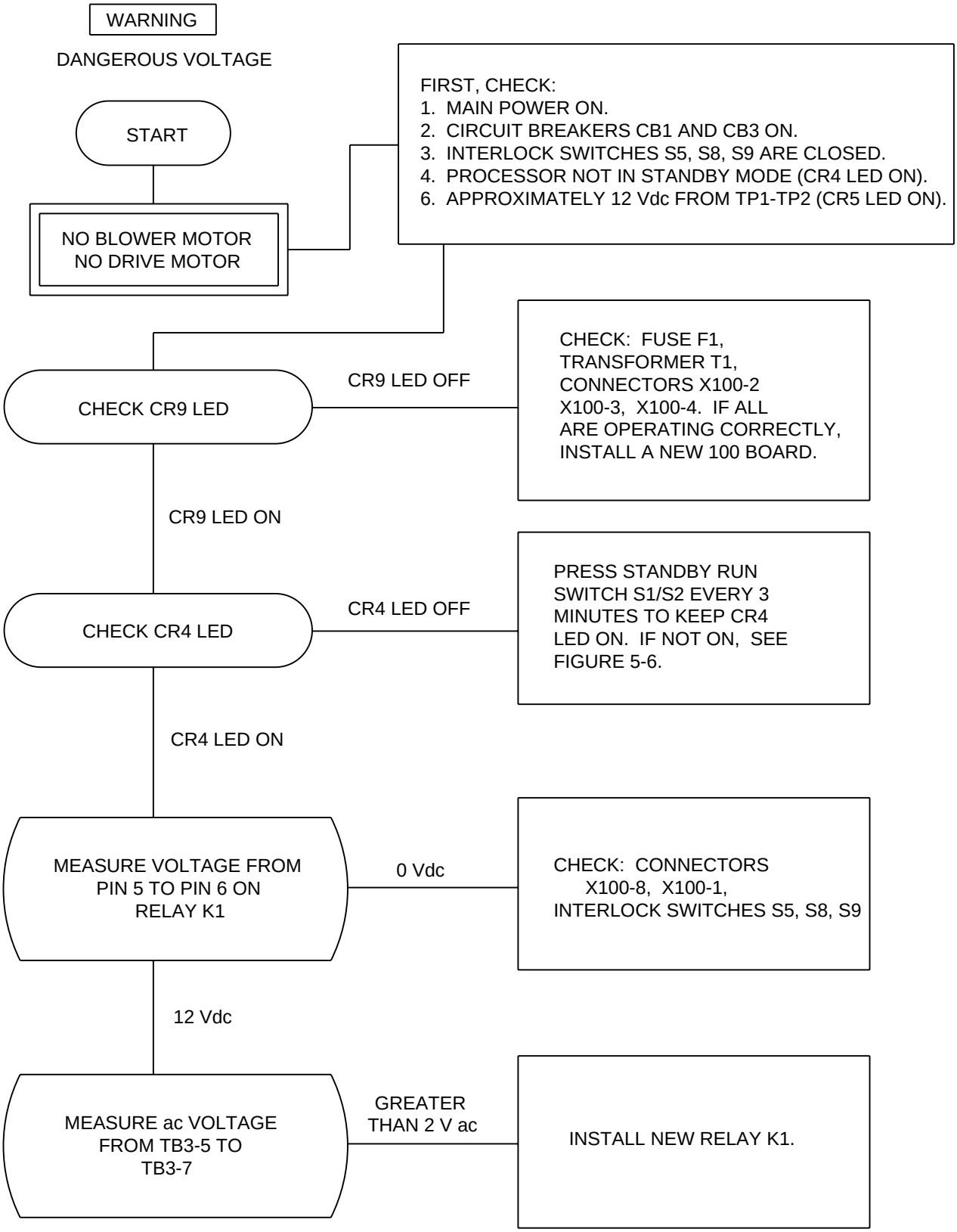

220 ± 40 V ac
MEASURE VOLTAGE FROM TB2-5 TO TB2-3
LESS THAN 180 Vac
CHECK WIRING TB2-3 TO TB2-7 AND TB2-5
220 ± 40 V ac
MEASURE ac VOLTAGE FROM TB2-3 TO TB2-8
LESS THAN 180 Vac
CHECK RELAY K1
220 ± 40 V ac
MEASURE ac VOLTAGE FROM TB2-8 TO TB2-7 AND TB2-5
LESS THAN 180 Vac
CHECK DRYER OVERTEMPERATURE THERMOSTAT S6
220 ± 40 V ac
MEASURE ac VOLTAGE FROM WIRE #4 OF S6 TO TB2-7 AND TB2-5
LESS THAN 180 Vac
WARNING - DANGEROUS VOLTAGE. DISCONNECT MAIN POWER.
CHECK DRYER HEATER R1 FOR APPROXIMATELY 17 Ω
INFINITE
RESISTANCE
INSTALL NEW DRYER HEATER R1

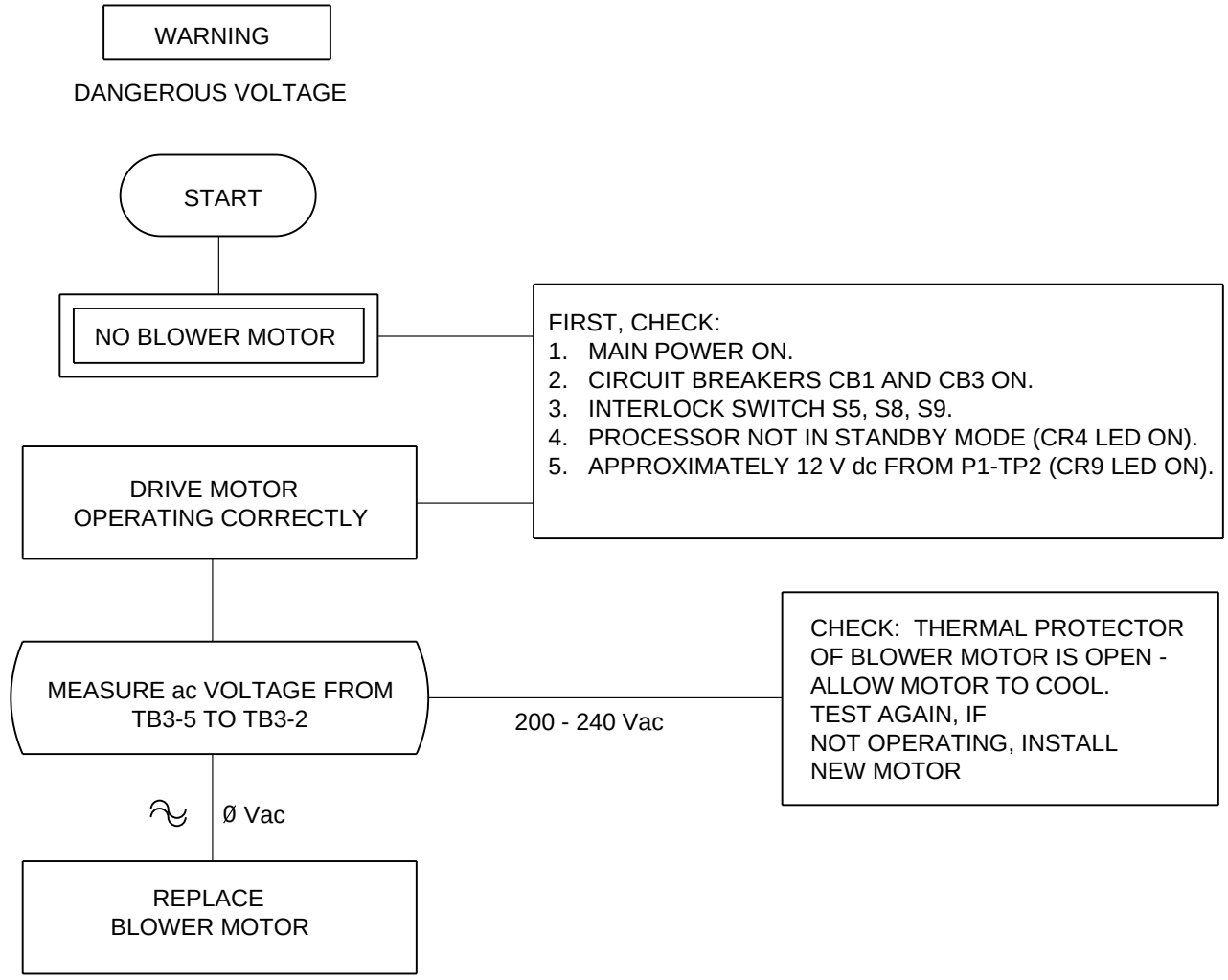
H176_9010EC

BLOWER MOTOR and DRIVE MOTOR: Not Operating


WARNING
DANGEROUS VOLTAGE
START
NO BLOWER MOTOR
NO DRIVE MOTOR
FIRST, CHECK:
1. MAIN POWER ON.
2. CIRCUIT BREAKERS CB1 AND CB3 ON.
3. INTERLOCK SWITCHES S5, S8, S9 ARE CLOSED.
4. PROCESSOR NOT IN STANDBY MODE (CR4 LED ON).
6. APPROXIMATELY 12 Vdc FROM TP1-TP2 (CR5 LED ON).
CHECK CR9 LED
CR9 LED OFF
CHECK: FUSE F1, TRANSFORMER T1, CONNECTORS X100-2 X100-3, X100-4. IF ALL ARE OPERATING CORRECTLY, INSTALL A NEW 100 BOARD.
CR9 LED ON
CHECK CR4 LED
CR4 LED OFF
PRESS STANDBY RUN SWITCH S1/S2 EVERY 3 MINUTES TO KEEP CR4 LED ON. IF NOT ON, SEE FIGURE 5-6.
CR4 LED ON
MEASURE VOLTAGE FROM PIN 5 TO PIN 6 ON RELAY K1
0 Vdc
CHECK: CONNECTORS X100-8, X100-1, INTERLOCK SWITCHES S5, S8, S9
12 Vdc
MEASURE ac VOLTAGE FROM TB3-5 TO TB3-7
GREATER THAN 2 V ac
INSTALL NEW RELAY K1.

NOTE:
ALL VOLTAGES ARE APPROXIMATE ONLY
DIAGNOSTIC FLOWCHART FOR THE DRYER TEMPERATURE CONTROL, AND MAIN DRIVE. H176_9002EC

BLOWER MOTOR: Not Operating



NOTE:
ALL VOLTAGES ARE APPROXIMATE ONLY.
DIAGNOSTIC FLOWCHART FOR THE DRYER
TEMPERATURE CONTROL, AND MAIN DRIVE

H176_9003DC

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HEALTH IMAGING